

Amendments to the Claims:

1. (Currently Amended) A device for *in vivo* determination of a concentration of a PET tracer in blood, including:

an image-producing device which generates a ~~locally-resolved depiction-3D image~~ of a region of the body including a body volume that is filled with blood;

a TOF-PET unit ~~for recording the~~ which records a concentration of the PET tracer in a predetermined PET volume element;

a data processing unit which is coupled to the image-producing device and to the TOF-PET unit, the data processing unit in conjunction with the image-producing device determines a spatial position of the body volume that is filled with blood and determines ~~detector element positions~~ a position of the TOF-PET unit ~~[[such]]~~ that places the predetermined PET volume element of the TOF-PET unit ~~[[lies]]~~ in the body volume that is filled with blood such that the TOF-PET unit measures the concentration of the PET tracer in the blood filled body volume that is imaged by the image-producing device.

2. (Previously Presented) The device as claimed in claim 1, wherein the TOF-PET unit comprises:

two γ detector elements that detect pairs of annihilation quanta, the two γ detector elements lie opposite one another and define the predetermined volume element on a line therebetween, and

corresponding evaluation electronics unit for recording times of flight of the pairs of detected annihilation quanta.

3. (Currently Amended) The device as claimed in claim 2, wherein the effective area of each γ detector element is between 10 mm² and 400 mm².

4. (Previously Presented) The device as claimed in claim 1, wherein the image-producing device includes one of an MRI device and an X-ray projection device.

5. (Previously Presented) The device as claimed in claim 1, further including a 3D PET device which records a three-dimensional distribution of the PET tracer in a body region.

6. (Previously Presented) The device as claimed in claim 1, wherein the data processing unit segments images produced by the image-producing device to identify the body volume that is filled with blood.

7. (Previously Presented) The device as claimed in claim 1, further including a display device for displaying images that have been produced with the image-producing device and an input means for interactive selection of a body volume in the displayed images.

8. (Previously Presented) The device as claimed in claim 1, wherein the body volume filled with blood lies in an aorta or in a left ventricle of a heart.

9. (Previously Presented) A method for the *in vivo* determination of the concentration of a PET tracer in the blood, comprising the steps of:

- production of at least one locally resolved image of a body region;
 - determination of the spatial position of a body volume filled with
- 5 blood on the basis of the image produced;
- recording of annihilation quanta coming out of the body volume, taking account of their times of flight.

10. (Currently Amended) The method as claimed in claim 9, further including:

- recording dynamic, three-dimensional, PET data in a further body region, and combining the determined concentration of the PET tracer in the blood
- 5 with the dynamic, three-dimensional, PET data.

11. (Previously Presented) The device as claimed in claim 2, wherein the TOF-PET unit includes only two detector elements to detect annihilation quanta pairs travelling along the line therebetween.

12-16. (Cancelled)

17. (Previously Presented) The device as claimed in claim 2, wherein the data processing unit further controls positioning the two γ detector elements such that the volume element on the line therebetween lies in the body volume.

18. (New) The method as claimed in claim 9, wherein the step of production of at least one locally resolved image of a body region includes:
generating a 3D diagnostic image of a region of a patient, which region includes a blood filled body volume.

19. (New) The method as claimed in claim 18, wherein the step of determination of the spatial position of the blood-filled body volume includes:
determining positions of a pair of TOF-PET detectors on opposite sides of the blood filled body volume such that a line between the pair of TOF-PET
5 detectors passes through the blood filled body volume;
detecting pairs of annihilation quanta from a PET tracer in the blood with the pair of TOF-PET detectors.

20. (New) The method as claimed in claim 19, wherein the step of recording of annihilation quanta includes:
using time of flight information to identify pairs of annihilation quanta emitted from the blood filled body volume;
5 determining a concentration of the PET tracer in the blood from the detected annihilation quanta pairs emitted from the blood in the blood filled body volume.

21. (New) The method as claimed in claim 20, further including:

generating temporally dynamic PET images of another region of the patient concurrently with determining the concentration of PET tracer in the blood;

5 associating the temporally dynamic PET images with the concurrently determined PET tracer concentration.

22. (New) A device for determining a concentration of a PET tracer in blood *in vivo*, the device comprising:

a diagnostic imaging device;

a pair of TOF-PET detectors; and

5 a data processor programmed to control the diagnostic imaging device and the pair of TOF-PET detectors and perform **the method as claimed in claim 20**.

23. (New) The device as claimed in claim 22, wherein the pair of TOF-PET detectors localizes an annihilation event location along the line between the pair of TOF-PET detectors.

24. (New) The method as claimed in claim 20, further including:

positioning the pair of TOF-PET detectors such that line therebetween passes through the blood filled body volume.